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ABSTRACT

Guidelines for teaching complex psychomotor skills are presented in three phases: 1) introductory, 2) practice, and 3) perfecting. The introductory phase of the model involves the preparation of the student for learning, the providing of information, and analysis of the skill. The second phase is concerned with the observation of student practice and the providing of feedback. The last phase is reinforcement and improvement through continued use of observation and feedback on precision performance. (CJ)

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PAPERS ON LEARNING AND TEACHING



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Michigan State University
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Teaching Complex
Psychomotor Skills

Revised Edition
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Paper # 71

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A Psychomotor skill is a physical skill; it involves the use of the senses and the muscles in the execution of a smooth, precise, well-timed performance. The skill is organized to relate to the space around the individual, and the skill is timed so that each muscle's performance comes into play at a certain moment. Examples: writing, drawing, operating machinery or laboratory equipment, swimming, sewing, driving.

Simplified Model in Teaching Psychomotor Skills

I. INTRODUCTORY PHASE

A	prepare student for learning the skill
B	provide information about the skill
C	require analysis of the skill

II. PRACTICE PHASE

A	require practice of the skill
B	observe student practice and prompt when needed
C	provide feedback when needed

III. PERFECTING PHASE

A	require precision performance
B	observe and prompt on details
C	provide feedback on fine points

HOW TO TEACH PSYCHOMOTOR SKILLS

WHY USE THOSE PROCEDURES

I. INTRODUCTORY PHASE

A. Prepare student for learning the skill

1. State objective to student

- A. Tell and show him what you want him to learn to do and the quality of the response you desire.
- B. Tell him you are after the whole skill, especially when what you teach is relatively simple or is a highly integrated performance.
- C. Tell him you are after a part of a skill only when the skill comes in discrete chunks which are not interwoven or the skill is very complicated or taxing on one's memory.

2. Check and bring to mind prerequisite knowledge and skill

- A. Check for and review prerequisite ideas. (Remediate deficiencies beforehand).
- B. Check for and review prerequisite skills. (Remediate deficiencies beforehand).
- C. Check for abilities; coordination patterns, speed, strength, endurance, balance, reaction time, kinesthesia, information processing time.
- D. Check for motivation and attitude toward skill.

The first phase of skill learning requires mental rather than physical activity. First, a person learns how a skill is done by acquiring information.

To capture and direct attention, a teacher gives a student a mental set: what he is to learn and what other ideas and abilities relate to the new skill.

What is a "whole" skill and what is "part" of a skill depends upon your perspective. Teaching a whole skill, in general, is more effective and efficient than teaching parts and then linking the parts together. A total skill makes sense to students. When teaching a whole skill, a teacher need not waste time later by integrating parts of skills. In practice, a teacher should choose the largest meaningful segment within the information processing and physical abilities of his students. Highly integrated skills or relatively simple skills should definitely be taught as whole pieces. Complex skills or skills involving lengthy sequences of discrete movements may be taught by parts but later the parts must be joined together in practice.

A student cannot learn a skill before he has acquired ideas and skills which act as its foundation. Every skill has different prerequisites; there are no all encompassing required abilities. There is only a small relation between verbal ability and psychomotor skills. A student will need some ability to process information and learn facts in initial stages; he will need strength and coordination in the practice phase, and he will benefit from motivation and endurance in the perfecting phase. To determine prerequisites, a task analysis is necessary for any complex and important skill.

B. Prepare information about the skill

Students must be told what to attend to in a complex demonstration.

1. Tell student what to attend to in the demonstration

- A. In advance tell student what to look at and look for.
- B. Provide some guide to aid in observation of demonstration.
- C. Do emphasize details.

2. Demonstrate the whole skill

In the early phases, the emphasis should be on the total skill. Later, in the perfecting phase, details should be stressed.

A. describe what you are doing as you are doing it

The demonstrations should tell a student how the skill is done and what the major cues and steps should be. To provide the essential cues, a teacher should label what is happening in a demonstration. A task description is an excellent aid for preparation.

- 1) what to look at
- 2) what to look for
- 3) what to do
- 4) what to look at to check results
- 5) what to look for to check results
- 6) what to do to remediate

B. present a simplified rule or a set of simplified rules to follow

C. be sure the student sees the whole task

A student needs a total picture of the skill to make it meaningful and to provide a mental "template" which he can use later to judge his own performance.

D. if the skill is very complex or fast, use artificial cues and guides (e.g., arrows, slow motion film)

E. pay most attention to difficult parts

F. emphasize proper action

G. keep the demonstration short

H. include only essential information

C. Require analysis of the skill

1. Provide brief verbal descriptions of the skill (but do 2 preferably)
2. Ask students to "code" their observations

If a student is asked to "code" information he will be more likely to remember and apply the ideas. A teacher can promote coding by asking students to use the information, e.g., analyzing someone's performance.

Information can be coded in images or words.

- A. Have them imagine what the skill looks like.
- B. Have them figure out in words what the steps are.

In the second phase of skill learning, students learn to do the skill and get feedback on their performance. The performance will be tense, inefficient, slow, awkward, and ill-timed. Now is the time to acquire the skill, learn its form and its timing.

II. PRACTICE PHASE

A. Require practice of the skill

Practice of the total unsimplified skill will promote transfer of learning and will save time later.

1. ask student to practice the total unsimplified skill.
 - A. ask the student to concentrate on how it feels or have her focus visually on the task.
2. Tell the student what you are going to look for
 - A. mention particular performance qualities
3. Provide practice
 - A. provide a number of practice trials in a row
 - B. Watch for fatigue and give breaks

Watching oneself perform sometimes interferes with the action and provides inappropriate cues. During practice, a person should concentrate on how good performance feels or how it looks depending on the task.

If you ask for a certain quality of performance, that is what students will deliver.

B. Observe student practice and prompt when needed

To prevent practicing errors, a teacher must observe and prompt students on general points and details. The idea is to work from broad form to specific details. Intervene to prompt after observing a number of successive trials without self-correction. Prompt by reflecting or questioning.

1. Observe practice

A. watch for general form of the skill

B. watch for gross errors

2. Provide verbal or physical cues

A. use hand on hand when necessary

B. cue with words

C. go easy on fine accuracy

C. Provide feedback when needed

For some time students will need feedback from an external source.

1. Provide appropriate feedback

A. provide knowledge of results (and performance) for open skills

B. provide knowledge of performance for closed skills

An open skill is one in which the performer responds to a dynamic event. A closed skill is one in which the performer tries to reproduce a pattern. Knowledge of performance, a description and critique of students' actions, is useful in both types of skills, but primarily useful in closed skills. Knowledge of results, a description and critique of the results of students' actions, is most useful in open skills.

2. Time feedback according to the skill

A. provide immediate feedback for continuous skills

B. provide delayed feedback for discrete skills

A continuous skill is one which contains a highly integrated sequence of moves. To prevent practicing a total skill in error, continuous skills must have immediate feedback. Discrete skills, those with separable parts, do not require immediate feedback, but do require some feedback before another practice trial.

3. Provide complete feedback

- A. tell the student what he did right, what he did wrong, what he should have done, and what to do next
- B. tell or show the student things he didn't already know about his performance

Few people want to be told they are wrong, to be embarrassed or discouraged. De-emphasize the student's errors, and emphasize improvement.

For feedback to be useful, present information the student does not already know. Sometimes videotape aids in providing such information.

III. PERFECTING PHASE

A. Require precision performance

- 1. Tell the student you are after details
 - A. work on fine points, fluency, speed
- 2. Require the student to practice beyond adequate performance
 - A. practice beyond lower limits when the performance is to be used many times later.
- 3. Add stress and interfering cues
- 4. Use mental practice when time and facilities are scarce, or when fatigue sets in.

In the perfecting phase, a student learns how to perform the skill automatically, fluently, with precision, under stress. As a student acquires precision, he acquires speed, but the rate of progress diminishes and students acquire perfection at different rates.

A student should continue to practice, even though she has shown adequate performance, to be more likely to reproduce the skill later on. If the skill is to be used frequently, this practice is unnecessary.

- 5. Distribute frequent practice sessions over time; use long enough sessions to get some improvement without undue fatigue.

Mental practice is better than no practice. Combined with physical practice, a session of mental practice is as effective as an additional session of physical practice, and it saves time, avoids fatigue, and requires no equipment. Mental practice is not useful without preceding actual experience.

The results of research on massed practice (many practice trials at once) and distributed practice (a few trials at once, then a few more later) are inconclusive. One can make a case for massed practice early or late and do the same for distributed practice. In terms of practical needs, massed practice may be used in the practice phase, and distributed practice in the perfecting phase.

6. Integrate any separate subskill that may have been learned.

7. Lengthy practice sessions are permissible depending on motivation and proficiency.

B. Observe and prompt on details

1. observe practice

A. for fine details

B. for speed and agility

2. provide minimal verbal or physical cues

C. Provide feedback on fine points

1. provide appropriate feedback (as in IIC3A)

2. provide necessary feedback

A. present information the student cannot already see for himself

Extra prompts and cues should be faded out by now; the student should be proceeding on his own.

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